SUMMER MICROHABITAT DISTRIBUTION OF SOME CENTIPEDES IN A DECIDUOUS AND CONIFEROUS COMMUNITY OF CENTRAL OHIO (CHILOPODA)[1,2]

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ABSTRACT: Centipedes were collected in a deciduous and coniferous community of central Ohio during the summer of 1972. A total of four orders, six families, and at least 17 species of centipedes were collected. There are few major distributional differences between the deciduous and coniferous communities with regard to the chilopod fauna except for the genus *Garibius* which preferred coniferous habitat and *Sonibius numius*, which favored deciduous areas. Several distributional trends with regard to microhabitat were observed. *Scolopocryptops sexspinosus, Bothropolys multidentatus, Sonibius numius*, and the genus *Garibius* were found exclusively under the bark of dead trees. The two genera, *Nadabius* and *Sozibius*, were dominant in the litter microhabitat. A single specimen of *Zygethobius pontis* was taken which is the first report of this species in Ohio.

Previous workers (Wood, 1865; Bollman, 1893; Chamberlin, 1925; Crabill, 1955, 1958, 1960, and others) investigating North American centipedes have concentrated their efforts on a systematic and distributional investigation of this group. The Ohio chilopod fauna was surveyed by Williams and Hefner in 1928. Few studies, with the exception of Auerback (1951), have considered in detail the specific habitat distribution of centipedes. The purpose of this study was to determine whether or not there were distributional differences in chilopod fauna at two levels: 1) by comparing deciduous and coniferous communities; and 2) by comparing the bark and litter microhabitats within each community.

METHODS:

Collection site. All centipedes were collected at 4-H Camp Ohio, located 13 km east of Utica, Ohio, on the northern edge of Licking County (T.4N R.11W). Camp Ohio's 200 acres is situated on the easternmost extension of the glaciated portion of Ohio. Collections were primarily made on ravine and hillside areas, as this was the forested area of the study site. The second growth mixed hardwood forests are primarily composed of

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white oak (*Quercus alba* L.), sugar maple (*Acer saccharum* March.), American beech (*Fagus grandifolia* Ehrh.), and shagbark hickory (*Carya ovata* Kock). Two eastern white pine (*Pinus strobus* L.) plantations, planted approximately 65 years ago, provided the coniferous habitat for collections.

Procedure. Within the deciduous woods and the pine plantations, centipedes were hand collected from beneath the bark of dead trees and from leaf litter on the forest floor. Spraying with Carnoy's solution (3 parts ethanol: 1 part chloroform: 1 part glacial acetic acid) generally slowed the chilopods so that they could be picked up with forceps. Due to the fineness of the pine litter, all collections in this microhabitat were confined to Tullgren funnel extractions. Determinations were made using A.A.-Weaver's unpublished key to centipedes, College of Wooster, Wooster, Ohio.

RESULTS:

Summer collections totaled 654 specimens, of which one hundred were so immature as to be unidentifiable to the generic level. These collections included representatives of each of the four Nearctic orders of centipedes. The lithobiomorphs comprised the greatest number of both individuals (75.9%) and species (Table 1). Twelve species and the genus *Tidabius* represented this order. Geophilomorphs were represented by *Strigamia bidens* and *Arctogeophilus umbraticus*, while the Scutigeromorpha and the Scolopendromorpha were each represented by a single species.

A comparison (Table 1) of the relative numbers of centipedes from deciduous and coniferous communitues shows that 77.6% (n = 430) of the individuals were collected in deciduous areas. Within the deciduous sample, 64.2% (n = 276) of the specimens were collected under bark, while the remainder were taken from litter on the forest floor.

In the coniferous habitat, 109 specimens were collected under bark and only 15 in leaf litter. The paucity of specimens from pine litter is, at least partially, due to the difficulty of hand collecting in this microhabitat. Thus, the low number of specimens from this microhabitat is likely a result of inadequate collecting techniques rather than a true reflection of the chilopod fauna in this microhabitat.

Six species and one genus were found in relatively large numbers (Table 1). When these taxa are examined according to their microhabitats of leaf litter and bark, several distinct trends are evident (Table 2). All specimens of *Scolopocryptops sexspinosus, Bothropolys multidentatus, Sonibius numius* and the genus *Garibius* were found under the bark of dead trees. *Sozibius pennsylvanicus* and *Nadabius pullus* were disproportionately

more abundant in litter (Table 2). *Arctogeophilus umbraticus* appeared to be distributed evenly between the two microhabitats.

Within the bark microhabitat certain distributional trends are evident with respect to the coniferous and deciduous habitats (Table 3). *S. sexspinosus* and *B. multidentatus* appear to be distributed irrespective of the general community type. *S. numius* demonstrated a preference for the deciduous community, while the genus *Garibius* was relatively more abundant in the pine plantations. Members of the genus *Nadabius* predominated (45.3%) in deciduous litter, while *Sozibius* accounted for an additional 37.5% of specimens collected in this microhabitat.

In the first two weeks of August six broods of *Arctogeophilus umbraticus* were observed beneath the bark of *Ulmus americana, Pinus strobus,* and *Quercus alba.* These clutches ranged from 30 to 51 with an average of 39.8 ± 7.7 (S.D.).

DISCUSSION:

The ethopolyid, *Bothropolys multidentatus*, has generally been reported as a dendrophilous species, preferring the high moisture conditions found in certain bark microhabitats (Auerback, 1951; Crabill, 1955). All specimens of this species were collected under bark. Two common large lithobiomorphs, *B. multidentatus* and *Lithobius forficatus*, appear to inhabit similar microhabitats in eastern United States, but are rarely collected together (Auerbach, 1951), Crabill (1958) suggests that *L. forficatus* was introduced from Europe and is normally found near areas of human activity. The results of this study are consistent with these observations, as all specimens of *L. forficatus* were collected along a well-drained road, while *B. multidentatus* was found in more mesic habitats of the study site.

Scolopocryptops sexspinosus is generally collected beneath stones and under bark, deep within rotting logs (Auerback, 1951; Branson and Batch, 1967, and others) as were all specimens in this study. Branson and Batch (1967) report that *Arctogeophilus umbraticus* utilizes a wide range of microhabitats. This geophilomorph was collected in litter and under bark in both deciduous and coniferous communities (Table 1). The genus *Nadabius* has often been reported in leaf litter (Rapp, 1946; Auerback, 1951) and under bark (Branson and Batch, 1967). These collections are in general agreement with the above observations; however, *Nadabius pullus* predominated in litter as did *Sozibius pennsylvanicus.*

Chamberlin (1913) states that *Garibius* is generally found under bark, as were all specimens in this study. Chamberlin also notes that this microlithobiid genus seems to prefer a coniferous community. Since the

white pine plantations were planted only sixty-five years ago, it appears that *Garibius* was able to invade the pines and establish a dominant position among the chilopod fauna. This invasion was presumably launched from the surrounding deciduous community where *Garibius* is present in relatively fewer numbers.

R.E. Crabill, Jr. (personal communication) indicated that soil pH may be a major factor regulating chilopod distributions. He suggests that lithobiids prefer soils with low pH as is characteristic of coniferous forests, while geophilomorphs often prefer higher pH soils. The soil pH values for the pine plantations are near 4.5, while in the deciduous areas pH's were variable, but generally higher. In this study the distribution of the lithobiid genus *Garibius* is consistent with the above suggestion as it predominates in the pine plantations. However, the lithobiid *Sonibius numius* and the geophilomorph *Arctogeophilus umbraticus* were distributed irregardless of habitat type.

A more complete picture of chilopod microhabitat distribution would have been obtained if fall and winter collections had been possible. Although relatively few stones were found in the study area, had the importance of the subsaxean habitat been realized at the time collections were made, greater efforts would have been expended to sample this microhabitat.

One specimen of *Zygethobius pontis* was collected within deciduous leaf litter, which is the first report of this species in Ohio. *Z. pontis* was reported by Chamberlin (1912) in Virginia and Tennessee. Specimens of this species have also been collected in West Virginia, Kentucky, Pennsylvania, and North Carolina (A.A. Weaver, personal communication). From these reports, *Z. pontis* appears to be distributed throughout the Appalachian, the Ridge and Valley and the Blue Ridge provinces. Since Licking County falls within the Appalachian province, it might have been expected that this species would be found in this area of Ohio.

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Table 1. Summary of centipede collections.

	MIXED DECIDUOUS		CONIF-EROUS		TOTAL
		Under		Under	
	Litter	Bark	Litter	Bark	Total
Order Scutigeromorpha					
Family Scutigeridae					
Scutigera coleoptrata (Linne)	1				1
Order Scolopendromorpha					
Family Cryptopidae					
Scolopocryptops sexspinosus (Say)		50		13	63
Order Geophilomorpha					
Family Geophilidae					
Strigamia bidens Wood	1				1
Strigamia sp.	2			1	3
Arctogeophilus umbraticus (McNeill)	21	29	1	15	66
Order Lithobiomorpha					
Family Henicopidae					
Zygethobius pontis Chamberlin	1				1
Family Ethopolyidae					
Bothropolys multidentatus (Newport)		51		18	69
Family Lithobiidae					
Sonibius numius (Chamberlin)		99		16	115
Garibius pagoketes Chamberlin		13		5	18
G. opicolens Chamberlin				2	2
G. monticolens Chamberlin				1	1
Garibius sp.		11		20	31
Nadabius pullus (Bollman)	49	7	7	2	65
N. aristeus Chamberlin	7				7
N. ameles Chamberlin	14	1	1		16
Nadabius sp.		3		13	16
Lithobius forficatus (Linne)		6			6
Sozibius proridens (Bollman)	1	1		1	3
S. pennsylvanicus Chamberlin	47	1	3		51
Sozibius sp.	10	1		2	13
Tidabius sp.		3	3		6
TOTAL	154	276	15	109	554

Table 2. Distribution of centipedes in microhabitats of leaf litter (L) and under bark (B).Chi-square significance level of $p < 0.001$ is denoted by *.

	N	%L	%B	
Expected distribution	554	31	69	
S. sexspinosus	63	0	100	*
B. multidentatus	69	0	100	*
S. numius	115	0	100	*
Garabius species	52	0	100	*
N. pullus	65	86	14	*
S. pennsylvanicus	51	91	9	*
A. umbraticus	66	33	67	

Table 3. Distribution of centipedes in coniferous (C) and deciduous (D) habitats. Chi-square significance level of $p < 0.001$ is denoted by *.

	N	%D	%C	
Expected distribution	385	72	28	
S. numius	115	86	14	*
Garibius species	52	46	54	*
S. sexspinosus	63	80	20	
B. multidentatus	69	73	27	

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